WE CLAIM:

1. A method of detecting a reaction byproduct produced by combining a compound with a sample, comprising:

providing a compound physically separated from a sample;

sealing the compound and the sample in a common environment;

waiting a predetermined time to allow the compound and the sample to at least partially equilibrate with the common environment;

combining the compound with the sample; and

detecting a reaction byproduct resulting from combining the compound with the sample.

2. The method of claim 1, further comprising moving the compound and the sample into the common environment, wherein the step of moving is performed before the step of sealing.

3. The method of claim 1, the compound and the sample being a first compound and a first sample, respectively, further comprising repeating the steps of providing, sealing, waiting, combining, and detecting for a second compound and a second sample.

4. The method of claim 3, wherein the first and second samples are positioned in a common sample holder.

5. The method of claim 4, wherein the first and second samples are positioned in respective wells of a microplate.

6. The method of claim 1, wherein the steps of providing, sealing, waiting, combining, and detecting are performed at least substantially automatically.

7. The method of claim 1, wherein the step of detecting is performed without removing the mixture formed by combining the compound with the sample from the common environment.

8. The method of claim 1, further comprising holding the relative positions of the compound and the sample at least substantially fixed, during the step of waiting.

9. The method of claim 1, wherein the reaction byproduct is thermal radiation.

10. The method of claim 1, wherein the reaction byproduct is luminescence radiation.

11. The method of claim 1, wherein the reaction byproduct is optical radiation.

12. The method of claim 1, wherein the reaction byproduct is a change in concentration of a constituent of at least one of the compound and the sample.

13. The method of claim 1, wherein the reaction byproduct is a metabolite or a catabolite.

14. The method of claim 1, wherein the reaction byproduct is a change in oxygen concentration.

15. The method of claim 1, wherein the reaction byproduct is a change in hydrogen ion concentration (pH).

16. The method of claim 1, wherein the predetermined time is between about 15 and 45 minutes.

17. The method of claim 1, wherein the size of the common environment is comparable to the size of a sample holder supporting the sample.

18. A system for detecting a reaction byproduct, comprising:

a sample substrate having a plurality of discrete sample sites configured to support a corresponding plurality of samples;

a transfer device configured to transport one or more compounds to the sample substrate and to hold the compounds in a fixed position relative to the samples until the compounds and the samples are equilibrated to a substantially similar state; and

a detector configured to detect the reaction byproduct.

19. The system of claim 18, wherein the detector comprises an optical device having an examination site and a detector, the optical device being configured preferentially to detect thermal infrared radiation transmitted from a sample positioned at a corresponding sample site at the examination site.

20. The system of claim 19, further comprising a processor incorporating instructions for and capable of carrying out the function of reducing noise by replacing at least a portion of the signal with a revised portion formed from distinguishable components of the signal representing thermal infrared radiation detected from the same position in the sample at different times or from different positions in the sample at the same time.

21. The system of claim 18, wherein the transfer device includes an actuator mechanism for actuating transfer of the compounds to and from the transfer device, and a plurality of compound holders for holding the compounds within the transfer device.

22. The system of claim 21, wherein the actuator mechanism includes an actuator plate, and a plurality of pistons connected to the actuator plate and in fluid communication with the compound holders.

23. The system of claim 21, wherein the transfer device is configured such that the compound holders form a secure interface with the sample sites.

24. The system of claim 23, wherein the interface is substantially impermeable.

25. The system of claim 23, wherein the interface is a substantially hermetic seal.

26. The system of claim 18, further comprising a chamber configured to provide a controlled common environment for the sample substrate and the transfer device.